

c) Recommendation

Accordingly, the special master recommends that the Court conclude as follows:

"Assigning pathing" in the first element in claim 1 of the '194 patent means assigning a call to a hardware-mapped signal path. The entire path through the base station is assigned based upon a particular slot/frequency assignment.

2. "capturing in a predetermined manner"

a) The Claim Element

The second element of claim 1 of the '194 patent calls for:

(2) capturing in a predetermined manner the information signal being processed according to pathing assigned at substep (1) to produce signal samples representative of the information signal;

b) The Parties' Proposed Constructions

The parties' respective proposed constructions are:

InterDigital's Proposed Construction

(2) According to the pathing just described, the signal being processed is acquired in a specified manner. This produces signal samples representative of the signal being processed.

Ericsson's Proposed Construction

This element requires converting an analog voice signal to/from digital signal samples and over the dedicated path assigned at step (1) to produce signal samples representative of the voice signal.

c) The Actual Issue in Dispute

Ericsson argues that the "proper interpretation for this limitation of Claim 1 of the '194 Patent requires converting an analog voice signal to/from digital signal samples." Ericsson's Post-Hearing Brief at 36. InterDigital disagrees.

d) Discussion

Ericsson states that during prosecution InterDigital amended application claim 32 to read "capturing in a predetermined manner the voice information signal," citing Ericsson Ex. 405 at 2. Ericsson's Post-Hearing Brief at 36. Ericsson's brief shows "voice" in bold face, as reproduced here, and states "(emphasis in original)." *Id.* That is a distortion of the actual document. Ericsson Ex. 405 is a copy of an amendment of August 17, 1994, in which then-pending claim 32 was being

amended. In the amendment, "voice" was not shown in bold face, but rather was underlined, not for emphasis, but to show what words were being added to the previous version of the claim as required by the PTO rules of practice, specifically 37 C.F.R. § 1.121.³⁷ Ericsson's brief also characterizes application claim 32 as "the predecessor to Claim 1." Ericsson's Post-Hearing Brief at 36. It was not. The same amendment appears in Joint Ex. 9, as part of the entire prosecution history for the '194 patent, at JME 01062 *et seq.* In the August 17, 1994, amendment, claim 32 was being amended for a second time. It was also amended a third time in an amendment of May 22, 1995, Joint Ex. 9 at JME 01114, and then cancelled in an amendment of February 23, 1996, *Id.* at JME 01141. The "predecessor" to parent claim 1 was application claim 68 presented in an amendment of April, 1997, three years later. *Id.* at JME 01230, 01234.

Even given that prosecution history, however, "capturing" does not mean or require "converting." In remarks accompanying the August 17, 1994, amendment, InterDigital explained that: "[c]apturing is the process of acquiring a signal, whether analog or digital by, for example, digitizing or sampling it. See column 1, lines 35-39 of the '375 patent which is the parent application to the instant continuation application." Joint Ex. 9 at JME 01063. Ericsson's other arguments on this issue similarly lack persuasive merit.

e) Recommendation

Other than rejecting Ericsson's argument that "capturing" actually means "converting" (which is the only disagreement the parties have identified), there is nothing in this claim element that requires *Markman*-type claim construction. The claim element is clear on its face and need not be restated.

B. Claim 4

1. "circuit path"/"linear modulator" and "linear amplifier"/"transmitter"

Claim 4 of the '194 patent provides, with the disputed terms shown in bold:

4. An apparatus for providing a plurality of voice signal channels on a plurality of forward direction carrier frequencies of a terrestrial RF telephone system, each

³⁷ 37 C.F.R. § 1.121 governs the manner of making amendments. Section 121 provides, in part, "[a] claim may be amended by directions to cancel the claim or by rewriting such claim with underlining below the matter added and brackets around the matter deleted."

of said forward direction carrier frequencies containing a plurality of slots, each of said forward direction carrier frequencies having an associated predetermined bandwidth which is designed to accommodate one analog voice signal channel therein, said apparatus comprising:

- a base station comprising:
 - a plurality of circuit paths for processing a plurality of forward direction digitized voice signals from a public switched telephone network;
 - a plurality of compressors for respectively compressing each of said forward direction digitized voice signals by analyzing the speech content of said forward direction digitized voice signals and by using voice compression to form respective forward direction compressed voice signals, each compressed voice signal having a bit rate of less than 16 kb/s;
 - a processor for assigning each of the compressed voice signals onto a dynamically assigned frequency/slot;
 - a plurality of channel controllers, each for sequentially combining said respective forward direction compressed voice signals into a single transmit channel bit stream, with each of the respective forward direction compressed signals occupying a respective repetitive sequential time slot in the transmit channel bit stream;
 - a plurality of linear modulators for modulating said plurality of transmit channel bit streams, each of said modulators including a linear amplifier and using modulation to transmit at least 2 bits/symbol at a channel bit rate of between 32 kbps and 64 kbps; and
 - a transmitter for RF transmitting said modulated signals on said forward direction frequency carriers to at least one mobile subscriber station, whereby said predetermined bandwidth is capable of carrying at least two bidirectional simultaneous conversations.

For reasons that will become clear shortly, those several disputed terms will be treated together.

2. The Parties' Proposed Constructions

The parties' respective proposed constructions for each of the several claim elements are:

Disputed Elements in Claim 4 of the '194 Patent	InterDigital's Proposed Construction	Ericsson's Proposed Construction
a plurality of circuit paths for processing a plurality of forward direction digitized voice signals from a public switched telephone network;	The base station has a number of circuit paths for processing forward direction digitized voice signals from a public switched telephone network.	This element requires that the base station have at least two fixed communication paths connected to the PSTN and through the base station for the duration of each call over

**Disputed Elements in
Claim 4 of the '194 Patent**

a plurality of linear modulators for modulating said plurality of transmit channel bit streams, each of said modulators including a linear amplifier and using modulation to transmit at least 2 bits/symbol at a channel bit rate of between 32 kbps and 64 kbps; and

a transmitter for RF transmitting said modulated signals on said forward direction frequency carriers to at least one mobile subscriber station, whereby said predetermined bandwidth is capable of carrying at least two bidirectional simultaneous conversations.

**InterDigital's Proposed Con-
struction**

The transmit channel bit streams from the channel controllers are then modulated for radio frequency transmission by linear modulators. The linear modulators include amplifiers with linear characteristics over a certain range, and the modulation used transmits at least two bits per symbol and at a channel bit rate of between 32 thousand bits per second and 64 thousand bits per second.

The modulated signals are then sent by a transmitter on the forward direction carrier frequencies to at least one mobile subscriber station. The bandwidth of the forward direction carrier frequencies is capable of carrying the forward portion of at least two bidirectional conversations at the same time.

**Ericsson's Proposed Con-
struction**

which a plurality of digitized voice signals are processed.

This element requires a plurality of linear modulators, each including a linear amplifier for processing a transmit channel bit stream, each linear modulator modulating the transmit channel bit stream to transmit at least 2 bits/symbol at a channel bit rate of between 32 kbps and 64 kbps.

As a matter of law, this claim element cannot encompass non-linear amplifiers or GMSK modulation.

This element requires an RF transmitter for transmitting each modulated transmit channel bit stream on a forward direction RF frequency carrier to at least one mobile subscriber station, wherein the predetermined bandwidth of each forward carrier that is designed to accommodate one analog voice signal channel is capable of simultaneously carrying at least two bidirectional conversations.

As a matter of law, the claimed apparatus is limited to a single cell system having one and only one base station in communication with at least one subscriber station.

3. Discussion

As is readily apparent, the parties' proposed constructions reflect other arguments, and other issues, that go far beyond, and are not germane to, resolving what a "circuit path," "linear modulator" and "linear amplifier," and "transmitter" is. Accordingly, the discussion here will focus on the actual terms in "dispute," although the word "dispute" is used loosely. There can be no serious genuine dispute over these terms.

a) "circuit paths"

(1) The Dispute

With respect to "circuit paths," Dr. Cox testified:

Q. (By Mr. Selinger) Lets go to Slide 57, please. I want to direct your attention to the term circuit paths." This is from Claim 4 of the '194 patent.

In your opinion, as of 1985, was the phrase "circuit paths" a term of art in the context in which it is used in this patent?

A. Well, circuit paths is a pretty broad term. It's used in a lot of different places. I think in order to really see what circuit paths means here, we need to look to the more specific information that's in the specification and the file history. And in doing that, my interpretation of circuit paths is the same as it was for pathing.

Transcript at 624. That a term is broad does not mean that it requires explanation or even construction. The term "circuit path" or "circuit paths," moreover, is not all that broad, and its meaning, in context:

a plurality of circuit paths for processing a plurality of forward direction digitized voice signals from a public switched telephone network

is not particularly obscure. In claim 1, "assigning pathing" was an issue because that term, as both parties' experts agreed, was not a term readily understood by one of ordinary skill in the art. Here, Dr. Cox did not say, like he did in connection with "assigning pathing," that the term was unusual (which, of course, it is not). He only said that the term was broad. But using broad terms is within the province of patentees. Encountering a broad term should not evoke a knee-jerk response to limit such term to specifically what is disclosed. Moreover, there are sufficient differences between claim 1 and claim 4 that it cannot be gainsaid that "assigning pathing" in claim 1 means the same as "circuit paths" in claim 4, or vice versa.

Dr. Levesque had little difficulty with the term "circuit paths," (Transcript at 334-35) and neither does the special master. As Dr. Levesque testified, "circuit paths" has a clearly understood meaning, and it is not the same as "assigning pathing" in claim 1.

(2) Recommendation

The special master recommends that the Court decline Ericsson's proposal to limit "circuit paths" to the same definition as "assigning pathing" in claim 1 of the '194 patent. The term is clear on its face and does not require further qualification or restatement other than, perhaps, to note that "circuit paths" here does not mean the same thing as "assigning pathing" in claim 1 of the '194 patent. InterDigital's suggested "construction" that "[t]he base station has a number of circuit paths for processing forward direction digitized voice signals from a public switched telephone network" is accurate, but largely just restates the claim and uses "circuit path" with no further explanation. That, of course, is not "construction" but restatement, which offers little assistance.

b) "linear modulator" and "linear amplifiers"

(1) The Dispute

With respect to "linear modulator" or "linear amplifiers," the core issue is whether the claim requires absolute linearity, which may be a physical impossibility. Dr. Levesque testified:

Q. Moving on now to the plurality of linear modulators. Would you please tell the Court what this feature addresses and whether you agree with InterDigital's proposed construction of this claim?

A. Yes. This claim language is referring to the way that the bit stream is transmitted through the RF system. Reference is made here to linear modulators. I think I made some comment in my report about this. Linear modulators is a well-understood term in the industry, even though if one tries to parse that phrase out word by word and ask are there such things as nonlinear modulators or what does this mean, it has to be interpreted in its entirety. And the reference is well understood in the field. It's a reference to the fact that the modulation is a modulation that requires the use of linear power amplification for reliable restoration of the signal stream at the other side of the system.

So, that's a long answer to explain what's meant by linear modulators. But just to emphasize the point that that is a well-understood term.

It goes on to say linear modulators include amplifiers with linear characteristics over a certain range, and that's recognizing the fact that there is no such - in the real world, an engineer knows that there is no such thing as a power amplifier

that has a perfect mathematically linear transfer characteristic. Power amplifiers are built to specifications, and someone versed in the art would understand that.

And it goes on to say the modulation used here transmits at least two bits per symbol in the channel and the channel bit rate between 32 and 64 kilobits.

MS. ADDISON: Your Honor, before I proceed, the Court apparently had some question yesterday about linear modulators or linear amplifiers.

SPECIAL MASTER: Would this be a good time?

MS. ADDISON: Certainly.

SPECIAL MASTER: Is the only -- can you put that back up on the screen, please?

The claim says linear amplifier -- and, of course, in InterDigital's proposed claim construction there's the reference to amplifiers with linear characteristics. In your view, is the only difference between those two take account for the fact that you cannot physically build an amplifier that is perfectly linear?

A. That's correct. In fact, power amplifiers are specified with character -- you go out and you buy a power amplifier and it will come with specifications that relate to how linear it is over an allowed drive range for the input signal. And different products will be specified in different ways. They might be specified in terms of the height of the third order intermod products. There are various ways in the industry of specifying them.

But an engineer -- a systems engineer who understands this field will understand that a power amplifier, which is designed and marketed as a linear power amplifier, actually has some specification that will put limits for that product on the degree of nonlinearity and will also -- the specification will also include some dynamic range for the input signals and the output signals.

So, it's just a reflection of the real world of designing power amplifiers. They're not -- when we draw a block diagram for the students we put in a mathematically precise linear power amplifier, but that's not what exists in the real world.

SPECIAL MASTER: You know, that's what always troubled me about my engineering school. When I became a senior they said it doesn't really work that way.

Do you see any substantive difference between the phrase linear amplifier in the claim and as proposed in the claim construction amplifiers with linear characteristics?

A. No, I do not.

SPECIAL MASTER: Would it be acceptable, then, if you were construing the claim to refer to linear amplifiers rather than amplifiers with linear characteristics, knowing as an engineer that there's no perfection in the real world?

A. I would have no -- personally would have no technical objection to doing that.

Transcript at 341-45. Ericsson says that its pre-hearing brief "amply demonstrates that IDC relied heavily on the fact that its claim defined 'linear' amplifiers and the prior art used 'non-linear amplifiers.' "

That is a stretch. What Ericsson presented in its pre-hearing brief consists largely of a purported "quotation" from a November 19, 1996 amendment. Ericsson presents that "quotation" in block form with ellipses between sentences, and without indicating original paragraph structure. The impression, of course, is that these several sentences appeared in the original in reasonably contiguous form, or at least somewhere in the same neighborhood. What the "quotation" actually is, though, contrary to what one might assume from the brief, is a selection of sentences originally appearing in multiple paragraphs over three pages which have been excerpted and then strung together with ellipses. That is misleading (despite that the citation indicates that the quotes are taken from pages 10-12) and improper.³⁸

Furthermore, substantively, what InterDigital was actually saying in the amendment was that non-linear amplifiers had been used, and had been a primary choice of the industry, for "several decades." According to InterDigital, the prior art (Kinoshita) recognized that one of the problems with TDMA technology was the increase in transmission power that was needed, and that Kinoshita chose non-linear amplifiers because they were more efficient than linear amplifiers. InterDigital contrasted the use of non-linear amplifiers with its selection of linear amplifiers even though linear amplifiers required more power consumption and increased cost. The choice of using a linear amplifier was one of several arguments that InterDigital made in distinguishing the invention from Kinoshita.

All of that, however, has absolutely nothing to do with the current issue. Ericsson presumably cites that amendment as potential support for an argument on prosecution history estoppel. But prosecution history estoppel is not at issue here – only claim construction.

The claim clearly calls for "linear modulators" and "linear amplifiers." Does that mean "linear" in the literal sense? Of course not. As Dr. Levesque explained, "in the real world, an engineer knows that there is no such thing as a power amplifier that has a perfect mathematically linear trans-

³⁸ See "The Bluebook – A Uniform System of Citation" Rule 5.4 (16th ed. 1996).

fer characteristic." In the referenced prosecution history, InterDigital distinguished linear from non-linear, but did not assert or represent that its linear amplifiers or linear modulators were perfectly linear or defied real world conditions. InterDigital also did not assert that its amplifiers or modulators were more "linear" than the prior art, *i.e.*, more perfect, but rather simply noted that the prior art used non-linear components.

(2) Recommendation

"Linear" in the context of the claims and prosecution history was certainly meant to mean the opposite of non-linear, *i.e.*, a proportional response rather than a non-proportional response. From the present record, there is no evidence that InterDigital intended a mathematically pure proportional response, or that InterDigital intended to differentiate other than merely between linear and non-linear components. The claim element is clear on its face and does not require any particular "construction."

c) "transmitter"

(1) The Dispute

With respect to the "transmitter" element,

a transmitter for RF transmitting said modulated signals on said forward direction frequency carriers to at least one mobile subscriber station, whereby said predetermined bandwidth is capable of carrying at least two bidirectional simultaneous conversations.

the controversy actually focuses on the "whereby" clause, namely "whereby said predetermined bandwidth is capable of carrying at least two bidirectional simultaneous conversations." Ericsson says that InterDigital, through its proposed construction, namely:

The modulated signals are then sent by a transmitter on the forward direction carrier frequencies to at least one mobile subscriber station. The bandwidth of the forward direction carrier frequencies is capable of carrying the forward portion of at least two bidirectional conversations at the same time.

is attempting to rewrite the whereby clause to correct a drafting error. Ericsson's Post-Hearing Brief at 38. InterDigital accuses Ericsson of "rewrit[ing] the feature in an attempt to impose ambiguity. InterDigital's Post-Hearing Brief at 26. But, despite the lengthy "construction" proposed above, Ericsson says in its brief in response that the whereby clause should be given its plain meaning. Er.

icsson's Post-Hearing Brief at 37. The special master agrees. The element is clear on its face and does not require any "construction." Further, neither of the parties' proposed constructions add any otherwise missing clarity to the claim element.

The parties do, however, express some disagreement over the effect of the "whereby" clause. InterDigital says that the "whereby" clause "merely states the result of the transmission on the forward direction frequency carriers." [Emphasis in original omitted.] InterDigital's Post-Hearing Brief at 26. Ericsson says that InterDigital relied on the "whereby" during prosecution to secure allowance, and that it is a substantive limitation. Ericsson's Post-Hearing Brief at 38.

Once again, the effect (or non-effect) of a "whereby" clause varies from case-to-case and from claim-to-claim. In some cases, "whereby" clauses simply state, as the word suggests, the result achieved by the other elements or limitations in a claim or claim element. See *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1172 (Fed. Cir. 1993) ("A 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim."). Even in that instance, of course, the "whereby" clause is not simply ignored, because courts must give meaning to all of the words in a claim, *Ethicon Endo-Surgery, Inc. v. United States Surgical Corp.*, 93 F.3d 1572, 1577 (Fed. Cir. 1996), and are not given any freedom to read any limitations out of a claim. *Exxon Chemical Patents, Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1555 (Fed. Cir. 1995), *cert. denied*, 518 U.S. 1020 (1996). When a "whereby" clause does nothing more than state a result, however, then it may not add anything of substance, even when considered as it must be. After all, if the "whereby" clauses simply states a result, then the limitations or elements for achieving that result have already been examined as substantive limitations, i.e., the claim has the same meaning with or without the "whereby" clause.

But "whereby" clauses come in several varieties. Some "whereby" clauses, depending on how they are drafted, do more than merely state a result. Some "whereby" clauses serve to introduce further descriptions of claim elements and limitations. Although patent drafting conventions and English grammar, in such instances, suggest that "wherein" should be used rather than "whereby," it is not the province of the court to redraft claims or even correct claim grammar. Substantively, it makes no difference whether "whereby" or "wherein" is used if the language of the clause actually serves to introduce further descriptions of claim elements and limitations. A "whereby" clause must always be considered whether it merely states a result or not, but in the later

instance what the clause says may change the substantive meaning or scope of a claim because of the added description.

The question thus becomes whether the clause "whereby said predetermined bandwidth is capable of carrying at least two bidirectional simultaneous conversations" merely states the result of "a transmitter for RF transmitting said modulated signals on said forward direction frequency carriers to at least one mobile subscriber station," (considered in the context of the claim as a whole) or whether that clause adds further description. The question virtually answers itself. The "whereby" clause plainly adds a further description of, and hence limitation on, the "predetermined bandwidth," namely the clause adds the requirement that the bandwidth must be capable of carrying at least two bidirectional simultaneous conversations. That is not a consequence or result necessarily required by the other limitations in this element, or in the claim as a whole. A potential issue arises as a result, of course, because the preamble calls for "each of said forward direction carrier frequencies having an associated predetermined bandwidth which is designed to accommodate one analog voice signal channel." Ericsson says that the claim does not make sense. Whether it does or does not, though, is an issue that must be addressed in the context of validity, not claim construction.

(2) Recommendation

Accordingly, the special master recommends that the Court conclude:

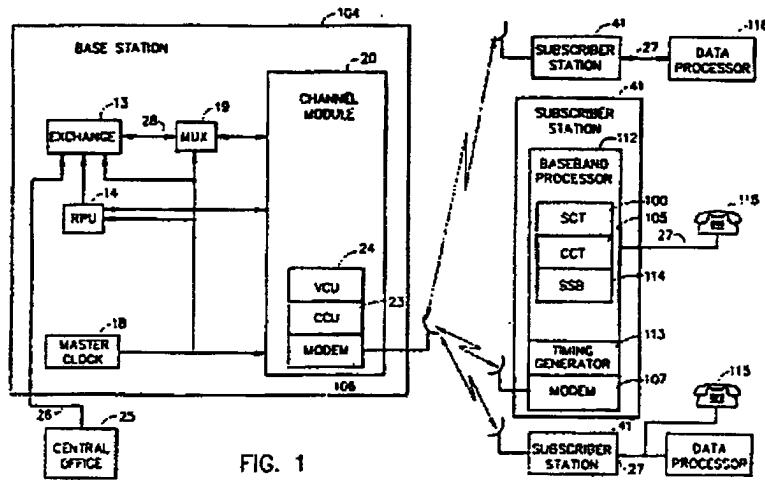
The "whereby" clause in the "transmitter" element of claim 4 of the '194 patent adds further description of the "predetermined bandwidth" and does not state a mere result.

VIII. U.S. Patent No. 4,811,420 ("the '420 Patent")

A. Brief Description

The specification explains that the invention of the '420 patent "generally pertains to subscriber communication systems and is particularly directed to initialization of a communication channel between a subscriber station and a base station in such a system." (Col. 1, lines 8-12)

Fig. 1 is said to illustrate a "block diagram of a preferred embodiment of the subscriber communication system of the present invention," (Col. 2, lines 30-32) specifically a base station 104 and a plurality of subscriber stations 41:



The specification explains that the base station 104 "includes an exchange 13, a remote-connection processing unit (RPU) 14, a master clock 18, a multiplexer unit (MUX) 19 and a channel module 20." According to the specification, "exchange 13 is coupled to a central office 25 by a plurality of two-wire line appearances 26," and "is coupled to the channel module by a T1 trunk 28 and the MUX 19." The specification explains that "MUX 19 multiplexes different communication channels in different time slots on the T1 trunk 28." The channel module 20, according to the specification, "includes a channel control unit (CCU) 23, a voice codec unit (VCU) 24, and a modem 106." The specification explains that "CCU 23 places communication channels in different radio frequency (RF) channels." The VCU 24, according to the specification, "conditions voice communication signals carried over the communication channels." Modem 106, the specification explains, "enables transmission and reception of voice and data communication signals over an assigned RF channel." The specification explains that "CCU 23 transfers communication signals between the assigned RF communication channel and the assigned communication channel in an assigned time slot on the T1 trunk 28," and that "RPU 14 monitors the status of the time slots on the T1 trunk 28 and the status of the RF channels and then assigns communication channels to predetermined time

slots and predetermined RF channels in accordance with a predetermined assignment routine." According to the specification, "CCU 23 exchanges control messages with the subscriber stations 41 over a radio control channel (RCC) in a given time slot of a predetermined RF channel." (Col. 3, lines 14-41)

On the other side of the communications link, the specification explains that each "subscriber station 41 includes a modem 107, a baseband processor 112 and an internal timing generator 113." The specification explains, and the drawing illustrates, that "baseband processor 112 is coupled by a two-wire interface line 27 to a subscriber terminal, such as a telephone 115 and/or a data processor 116." According to the specification, "baseband processor 112 includes two software-implemented modules, a subscriber control task (SCT) module 100 and a channel control task (CCT) module 105." The specification explains that "CCT 105 is responsible for word synchronization and framing, detection and resolution of collisions, and error detection," that is, according to the specification, "CCU 23 and all CCTs 105 that are listening on the RCC must exhaustively check for a valid RCC message in every RCC slot. The CCT 105 performs *inter alia* word synchronization "by scanning for a unique word (UW) in a window +/- 4 symbols about a nominal UW location, based upon master system timing." The specification explains that "CCU 23 listening on the RCC scans for the unique word in a window +/- 3 symbols about the nominal UW location," and that a "search algorithm shifts the data until it finds the UW pattern, or until all possibilities have been exhausted." Once the UW pattern is found, according to the specification, "the RCC message is considered valid only if an RCC checksum is correct." (Col. 3, lines 42-63)

B. Claim 3

1. "selective communication"

Claim 3 is the only claim of the '420 parent that InterDigital asserts. There are several claim terms in dispute, and the first is "selective communication" in the preamble of claim 3. Viewing the issue in context, however, the entirety of claim 3 provides:

3. A subscriber communication system including a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations and having means to transmit control information to its subscriber stations over a radio control channel (RCC) at a frequency selected by the base station from a plurality of predetermined frequencies

each base station, including

a master clock for providing a system timing signal; and

each subscriber station including

an internal timing generator for generating a subscriber station timing signal for timing the signals that are transmitted over a given communication channel from each subscriber station to a base station; and

means for providing a refinement signal timed by the subscriber station timing signal;

means operable upon initial establishment of a communication channel between a base station and a subscriber station for transmitting the refinement signal over the respective communication channel from the subscriber station to the base station;

wherein each base station further includes

means for processing the refinement signal received from a subscriber station in relation to the system timing signal to determine the value of any offset between the timing of the system timing signal and the timing of the refinement signal;

means for communicating the determined offset value to the subscriber station; and

wherein the subscriber station further includes

means coupled to the internal timing generator for processing the offset value communicated from the base station to adjust the subscriber station timing signal to reduce said offset.

a) The Parties' Proposed Constructions

As with the Paneth or "system" patents, the parties have proposed claim construction orders that "construe" every word in the claim. The Court is not required to do that. Accordingly, this report and recommendation will again focus on only those terms and phrases that appear to be in genuine dispute.

With respect to the current "selective communication" issue, the parties have proposed constructions for the portion of the claim preamble calling for:

a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations

InterDigital's Proposed Construction

Ericsson's Proposed Construction

InterDigital's Proposed Construction

Claim 3 requires a communication system that has more than one base station, each in a separate network. Each base station can communicate with more than one subscriber station in its network.

Ericsson's Proposed Construction

This element requires at least two separate networks with only a single base station in each network, and the base station in each network communicates with two or more subscriber stations which are predefined members of the same network. Those subscriber stations communicate directly only with the base station of their network.

Specifically, the issue is whether "selective communication" means, as Ericsson says, that "subscriber stations communicate directly only with the base station of their network." InterDigital has not proposed any specific interpretation of "selective communication."

Dr. Levesque did, however, criticize Ericsson's proposed construction as attempting "to define some kind of a permanent once and forever relationship between a subscriber station and the base station that it happens to be communicating with." Transcript at 359. Ericsson says that is "what that ambiguous term ['selective communication'] means when defined in the context of relevant evidence." Ericsson's Post-Hearing Brief at 39.

b) Discussion

Ericsson points for support for its interpretation to column 5, lines 20-26 of the specification. Before turning to that portion of the specification, however, some background is necessary, particularly background concerning subscriber control task (SCT) module 100 briefly mentioned above. The specification explains that

The SCT 100 implements an ROC frequency search algorithm. The purpose of the ROC search is to allow the subscriber station 41 to find the base station 104 of the same network as the subscriber station 41 as quickly as possible, and to prohibit the subscriber station 41 from attempting to communicate with known incorrect networks. Each base station 104 has a unique network identification number (NID). Each subscriber station 41 has a unique 24-bit subscriber identification number (SID). The SID is stored in an EEPROM in the subscriber station 41. All the SID's in a particular network are stored in the network database at the base station 104.

(Col. 3, line 64-Col. 4, line 8) The specification also explains that:

Each time the SCT 100 performs a reset it reads the SID and NID from the EEPROM. If no NID exists in the EEPROM, it is set to zero by default. When the SCT 100 gains sync on an RCC frequency in a passive search, it compares the received NID to the internally stored NID and reject all RCC frequencies with nonmatching NIDs.

(Col. 4, lines 26-32) The specification further explains that:

The SCT 100 determines the subscriber station network affiliation and NID through the normal call setup procedure. The SCT 100 executes a search of frequencies. Each time the SCT 100 gains sync on an RCC frequency it sends a CALL REQUEST RCC message. If the base station 104 recognizes the SID it responds with either a CALL CONNECT message if it wishes to complete the call, or a CLEAR INDICATION message with the reorder clearing code if it is too busy to complete the call. In either case, the search ends and the NID in the data field of the RCC message is saved in an EEPROM by the subscriber station 41 for memory retention during power interruptions.

If the base station 104 does not recognize the SID it sends a CLEAR INDICATION message with the unknown subscriber clearing code to the subscriber station 41. The SCT 100 then generates the next frequency on which to search for the RCC. The absence of an Acknowledgment from the base station also forces the SCT 100 to generate the next frequency on which to search. A new frequency also may be requested by the OCT 105 due to a loss of sync.

(Col. 4, lines 44-65)

With that background, the portion of the specification that Ericsson is relying on states:

Each time the SCT 100 gains sync on an RCC it looks for a match between its stored NID and the received NID. If there is no match, the SCT 100 has gained sync on the wrong network, and the SCT 100 generates a new frequency on which to attempt to gain sync. If the NID's do match, then the SCT 100 has located the correct network and the search ends.

(Col. 5, lines 20-26) Dr. Cox testified that the first sentence meant:

A. Well, this statement says that a subscriber station compares, looking at some of the things that aren't on there, the network identification number that it has stored with one that is received from a base station and if the two don't match, then the subscriber station decides it's in the wrong network and the – the synchronization on the wrong network. So the selection is based upon comparing network identification numbers.

Transcript 634-35. With respect to the second sentence, Dr. Cox testified that:

A. This is the opposite side of that coin. We just said what happens if it doesn't match. This says what happens if they do match. If they do match, then it says that the subscriber station has located the correct network. The "the" implies a network or the singular network, the network that's associated with that subscriber station, the base station.

Transcript at 635.

Dr. Cox's testimony, although reproduced here for sake of completeness, is not particularly helpful. That testimony merely repeats what is evident from the specification, and gives scant insight beyond that. But, Dr. Levesque's testimony was not helpful either. Transcript at 359. Lamenting how unreasonable a position is does not assist in arriving at a correct construction.

The prosecution history offers no assistance. The disputed term appeared in the claims with neither fanfare nor explanation. The specification likewise offers little – bordering on no – assistance. There is no clear basis in the specification for the term, and Ericsson's reliance on column 5, lines 20-26 offers only marginal support.

The lack of guidance from the patent owner, InterDigital, though is troubling. Clearly, as the patent owner, InterDigital has some obligation to offer a reasonable and supported construction for a term that is obviously at issue, and that has no clear or plain meaning from any one of the claim context, the specification, or the prosecution history. Instead, InterDigital says simply that the "teaching of the '420 patent explains that each subscriber station stores identification numbers in a programmable memory, and each base station stores identification numbers in a database," and that "Ericsson's argument would preclude any changes to the programmable memory, which contradicts the teaching of the patent." InterDigital's Post-Hearing Brief at 28. InterDigital's citations for support to the specification for those statements are largely those reproduced above.

There is no dispute, nor can there be, that an EEPROM is a programmable memory. Its very name is derived from "Electrically Erasable Programmable Read Only Memory." (Col. 2, line 51) But that is not the point. Of course the EEPROM may be programmed and re-programmed. As the foregoing excerpts from the specification explain, however, the EEPROM in the subscriber station learns the NID, and the network it is assigned to, from the base station when the base station

recognizes its SID. "All the SID's in a particular network are stored in the network database at the base station 104." (Col. 4, lines 6-8) The specification explains that a "subscriber station 41 is accepted into a network and determines its NID only through active search." (Col. 4, lines 11-13) That NID is then stored in the EEPROM. (Col. 4, lines 53-56) That stored NID is then used to determine whether, when the SCT 100 gains synch on an RCC, it has located the correct network. (Col. 5, lines 20-26) The specification also explains that the "purpose of the RCC search is to allow the subscriber station 41 to find the base station 104 of the same network as the subscriber station 41 as quickly as possible, and to prohibit the subscriber station 41 from attempting to communicate with known incorrect networks." (Col. 3, line 65-Col. 4, line 2) All of that appears to be entirely consistent with Ericsson's proposed construction.

On the other hand, Ericsson says the "specification also nowhere suggests that the database of SIDs in a base station can be changed in any way or moved from base station-to-base station, database-to-database, or network-to-network to permit what IDC advocates is the ability of Claim 3 to have a subscriber communicate with more than one network." Ericsson's Post-Hearing Brief at 40. That argument thus provides fuel to Dr. Levesque's fire that Ericsson is limiting the claim to "some kind of a permanent once and forever relationship between a subscriber station and the base station that it happens to be communicating with." In the draft report and recommendation, it was noted that it was not necessary to go that far.³⁹

The draft report and recommendation noted that:

Although Ericsson is correct that the specification of the '420 patent does not expressly teach changing or moving the SID database, certainly a database may physically reside on, or be accessible, by more than one computer. It is a common every day experience that a database of names and telephone numbers (i.e., contact information) may, for example, reside on a computer at one's office and at one's home. That same database may be shared with a colleague.

³⁹ Ericsson in its comments on the draft report and recommendation says that it did not request the construction that Dr. Levesque had attributed to it, and that Ericsson was construing the term "selective communication" to mean "that each subscriber station is a predefined member of only a single network at a time." [Emphasis in original.] Ericsson's Comments at 2. Ericsson cites as support, with the introductory signal "See," Ericsson's proposed order at 22. Ericsson's Comments at 3 n. 1. InterDigital responds that the "text that Ericsson is now proposing ('one network at a time') does not appear in any of Ericsson's prior claim charts or briefs and was not used by Ericsson's counsel or experts during the *Martenian* hearing." InterDigital's Response at 2. InterDigital is correct.

Draft Report and Recommendation at 185. Following that draft, Ericsson commented that such "common everyday experience" was not in the record, was subject to challenge as not being restricted to the time of the invention, and was "directly at odds" with the disclosure. Ericsson's Comments at 5. Ericsson is correct that the record does not contain testimony regarding what may or may not have been "common knowledge" at the time of the invention. Accordingly, what may or may not have been "common knowledge" at the time of the invention or now is expressly disregarded.

The fact remains, however, as noted in the draft report and recommendation, that the specification plainly contemplates multiple base station-subscriber stations networks (see e.g., "[t]he purpose of the RCC search is to allow the subscriber station 41 to find the base station 104 of the same network * * *," col. 3, lines 65-68, "A * * * system including a plurality of base stations, each in a separate network * * *, claim 3, preamble) and subscriber stations are able to communicate with a base station if that base station has the subscriber station's SID in its database. Although the specification does not expressly state that a database of SIDs, including the SID for a particular subscriber station, may physically reside on, or be accessible by, more than one base station, likewise nothing in the specification precludes that. Ericsson has furthermore not pointed to any technical disclosure in the specification that would suggest otherwise. If the SID resides in a database accessible by one or more base stations (and the other communication protocols are satisfied), a subscriber station is physically capable of establishing communication with more than one base station.

The preamble of claim 3, in context, calls for:

A subscriber communication system including a plurality of base stations, each in a separate network, the base station in each network being in selective communication with a plurality of subscriber stations and having means to transmit control information to its subscriber stations over a radio control channel (RCC) at a frequency selected by the base station from a plurality of predetermined frequencies * * *. [Emphasis added.]

Claim 3 thus contemplates a "system" that includes (1) a plurality of base stations, (2) each of which is in a separate network. A "plurality" means more than one. Thus, the "system" includes at least two networks. The reference to the base station in each network being "in selective communication with a plurality of subscriber stations" does not limit the subscriber stations to a single network. Each of the base stations is in a separate network, but the same limitation does not *per se* apply to the

subscriber stations. However, a subscriber station is unable to establish communication with a base station if that base station does not have that subscriber station's SID.

Thus, in a "system" having two or more "networks," each having a base station, the "selectivity" of the communication depends on the list of SIDs stored in the network database at the base station(s). The base stations are able to "selectively" communicate through the selection of SIDs in their respective databases. Ericsson's proposed construction is correct to the extent that the subscriber stations are "predefined members" of a network, but going the extra step and limiting that to "predefined members of the same network" is not justified. Neither the claim nor the specification says that a subscriber station can only be a member of a single network.

That was the conclusion reached in the draft report and recommendation. In its comments on that draft, Ericsson asserts that "[e]ven assuming, arguendo, that a subscriber station's SID could reside in more than one network database, the subscriber station can communicate directly with only one network at a time." Ericsson's Comments at 2.

Ericsson points to the "active" and "passive" searches described in the specification. Col. 4, lines 42-43, 53-56, Col. 5, lines 27-50. Ericsson notes that according to the specification when a subscriber station performs an "active search" to determine its network affiliation, and when that search finds its network affiliation, the search stops. Ericsson says that the "fact that the search stops after one base station is located is support in the specification that the subscriber station can only be a member of a single network at a time." Ericsson's Comments at 3.

Ericsson further asserts that, according to the specification, simply because a base station has a subscriber station's SID in its database does not necessarily mean that a base station is always able to establish communication with that subscriber station. Specifically, Ericsson notes *inter alia* that, according to the specification, subscriber stations store the NID of the base station that accepts its RCC request in its EEPROM, and that once stored, the "home base station" or "affiliated network" is "the only network from which the subscriber station can receive a call because the stored home NID must always match the calling base station's NID." Ericsson's Comments at 4. Ericsson further notes that "[a]ssuming a subscriber station's SID may be stored in more than one base station, when a call to a subscriber station comes in from the PSTN to a base station other than the one whose NID is currently stored in the subscriber station's EEPROM, but is one in which the sub-

scriber station's SID is also stored, that base station would recognize that [] subscriber's station's SID and attempt to establish a connection to that subscriber. In that circumstance, however, a successful connection could never happen because the stored NID in the subscriber station's EEPROM would not match the transmitted NID from the base station." *Id.* at 4-5.

InterDigital responds that the active and passive searches described in the specification and by Ericsson "do not prevent a subscriber station from being a member of more than one network." Specifically, InterDigital argues that simply because "a search may stop after the first base station is located does not preclude the existence of other base stations that could communicate with the subscriber station," and that the specification "does not restrict the scope of the claims by limiting a particular subscriber to a single network." InterDigital's Response at 3. The special master agrees. The portions of the specification that Ericsson relies on do not preclude a subscriber station from being a predefined member of more than one network.

However, in reconsidering the issue and having again reviewed the specification as a whole in detail, the special master is compelled to agree with Ericsson that the written description solely describes a system in which a subscriber station can communicate directly with only one network at a time. Moreover, InterDigital's response does not state otherwise.

InterDigital does, however, note that Ericsson's current construction ("one network at a time") was not part of Ericsson's prior claim charts or briefs, and was not advanced by either Ericsson's counsel or its experts during the *Markman* hearing. InterDigital's Response at 2. What InterDigital says is true. It is more than slightly troubling that Ericsson raises the "one at a time" issue belatedly. The Federal Circuit has criticized litigants for changing their respective positions on claim construction mid-stream. *Key Pharmaceuticals v. Hercon Laboratories, Corp.*, 161 F.3d 709, 715 (Fed. Cir. 1998) ("litigants hardly need warning not to engage in such conduct."). The Federal Circuit has also indicated that at least when the parties do so on appeal, the court could refuse to consider the revised construction. *Id.*

In *Key*, however, the parties both wholly reversed their claim construction arguments on appeal. Here the change is not so drastic, albeit significant. Also, the Court here, at the trial level, is required to adopt the correct (or, at least, the most correct) claim construction based on the record –

which now contains Ericsson's comments. Moreover, Ericsson's interpretation of the specification is correct.

c) Recommendation

In the draft report and recommendation, the special master recommended that the Court conclude that:

In claim 3 of the '420 patent-in-suit, the term "selectively communicate" in the claim preamble means that subscriber stations are predefined members of a network, however, a subscriber station may be a predefined member of more than one network.

Now, having considered the foregoing, the special master withdraws that recommendation, and recommends that the Court conclude:

In claim 3 of the '420 patent-in-suit, the term "selectively communicate" in the claim preamble means that subscriber stations are predefined members of a network. A subscriber station may be a predefined member of more than one network, but a subscriber station can communicate directly with only one network at a time.

2. "means * * *"

a) The Claim Elements

Claim 3 contains four "means" clauses in dispute. They are the "means operable," "means for processing," "means for communicating," and "means coupled" clauses. In the context of claim 3, those clauses read:

each subscriber station including

* * * * *

means operable upon initial establishment of a communication channel between a base station and a subscriber station for transmitting the refinement signal over the respective communication channel from the subscriber station to the base station;

wherein each base station further includes

means for processing the refinement signal received from a subscriber station in relation to the system timing signal to determine the value of any offset between the timing of the system timing signal and the timing of the refinement signal;

means for communicating the determined offset value to the subscriber station; and

wherein the subscriber station further includes

means coupled to the internal timing generator for processing the offset value communicated from the base station to adjust the subscriber station timing signal to reduce said offset. [Emphasis added.]

Because the issues are similar, those clauses will be treated together. The parties agree, and the special master agrees, that those clauses are drafted in means-plus-function format and require construction under § 112(6).

b) Issues in Dispute

The principle dispute that divides the parties is whether the software disclosed for performing the recited function is part of the "corresponding structure." As discussed above in conjunction with other claims involving the same issue, the software for performing the claimed functions is part of the "corresponding structure." *WMS Gaming*, 184 F.3d at 1349. On the other hand, the "corresponding structure" only includes so much of that software as is required to perform the claimed functions. *See Micro Chem II*, 194 F.3d at 1258.

Fig. 3 of the '420 patent is a flow-diagram said to illustrate the "processing routines for refining the timing of subscriber station signal transmissions to the base station." (Col. 2, lines 38-40):

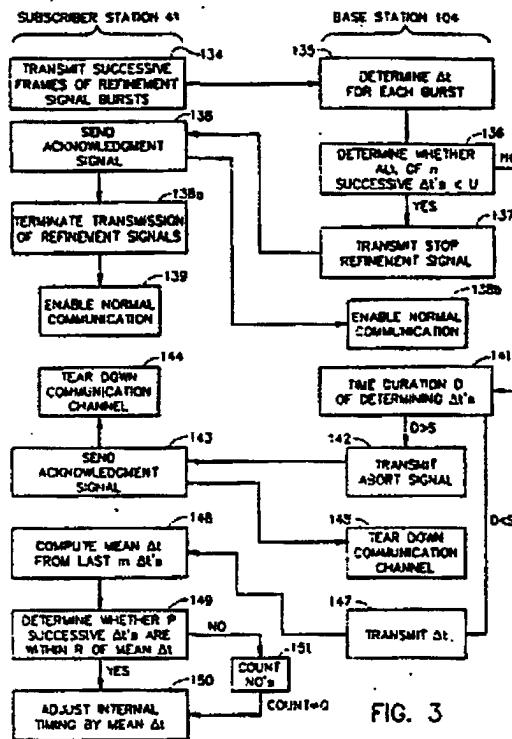


FIG. 3

Dr. Cox explained his understanding of Fig. 3 during his testimony, and InterDigital did not contradict that testimony. The following is Dr. Cox's explanation through the step of enabling communication:

Q. Would you briefly walk us through that flow chart?

A. This is a somewhat complicated one. In the initiation, the subscriber station up here in the upper left-hand corner transmits some frames of a refinement signal, a refinement signal burst as it shows up here. Those are received by a base station, each one of the bursts. It's hard to see up there, but the base station determines the timing difference between the timing burst sent to the subscriber stations. And the timing in the base station is called Delta T.

Q. You're pointing to Nos. 134 and 135, correct?

A. Number 134 is the subscriber station transmitting the burst. Number 1 - I can't hardly see those numbers. 135 - I'm getting old. My eyes aren't so good.

SPECIAL MASTER: It should be on your screen down there.

A. Yes, I can look down here even if I point up there.

It determines the time difference here, Delta T, between the transmitted burst and the timing at the base station. It does this for a series of bursts and then comes down here to Box 136 where it determines if the measured time difference is within some tolerance as specified for a given number of bursts, specified number of bursts. And if that's not true, then some things happen down here that we can come back to.

If this timing is within specified limits for a specified number of bursts, then we drop down here to this Box 137 and the base station transmits a stop refinement signal. So it tells the subscriber station to stop transmitting the refinement signal to receive at the subscriber station. And the action is indicated here in Box 138. There's an acknowledgment signal that's sent from the subscriber station back to the base station that enables the normal communications.

Also, at the same time, there's a signal sent by the subscriber from the subscriber station when it receives this stop transmit signal, and it terminates the transmission of the refinement signal and enables the normal communications in the subscriber set. So at this point, we have the enabling of communications between the two and the termination of the refinement burst.

Do you want me to follow on down from here?

Transcript at 636-638. Counsel correctly responded that was "probably enough."

c) The Parties' Proposed Constructions and Special Master's Recommendations

The parties' respective proposed constructions are lengthy, but are nevertheless set out below in conjunction with each claim element. Ericsson's proposed construction here, like it was above, includes a description of what the software assertedly does. It is not necessary for the Court to describe what the software does for the reasons discussed above. In some instances, the parties disagree over which hardware components perform the claimed functions. The parties' post-hearing briefs, however, devote little discussion to those differences. As mentioned above, the parties' primary disagreement was whether the software that is described for performing the recited functions is part of the "corresponding structure." That has been resolved; it is. Accordingly, the special master will, following the parties' respective proposed interpretations, identify (1) the claimed function, and (2) the "corresponding structure" discerned from the specification.

Beginning with the "means operable" clause:

means operable upon initial establishment of a communication channel between a base station and a subscriber station for transmitting the refinement sig-

rial over the respective communication channel from the subscriber station to the base station;

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

The subscriber station has a mechanism that transmits the refinement signal from the subscriber station to the base station over the communication channel. The signal is transmitted upon initial establishment of the communication channel.

The function is to transmit a refinement signal from the subscriber station to the base station. The corresponding structure is modem 107 and equivalents thereof

The means for transmitting is operable only upon initial establishment of a communication channel between a base station and a subscriber station.

The recited function of this "means-plus-function" element is transmitting the refinement signal to the base station over an established communication channel between the base station and subscriber station in response to the initial establishment of a communication channel.

The disclosed structure is the subscriber station modem, baseband processor, and an associated control software routine which is configured, prior to the enablement of normal voice communication, to transmit successive frames of refinement signal bursts until it receives a "Stop Refinement" signal from the base station. The associated control software is then configured to send an "Acknowledgment" signal back to the base station, terminate any further transmission of refinement signals, and enable normal voice communication.

The special master recommends that the Court conclude as follows:

The claimed function is of the "means" is "transmitting the refinement signal over the respective communication channel from the subscriber station to the base station." That means is "operable upon initial establishment of a communication channel between a base station and a subscriber station." The "corresponding structure" disclosed for performing that function is modem 107, baseband processor 112, and associated software described as performing that function.

Under the terms of § 112(6), the claim should therefore be construed to cover that corresponding structure and equivalents thereof.

means for processing the refinement signal received from a subscriber station in relation to the system timing signal to determine the value of any offset between the timing of the system timing signal and the timing of the refinement signal;

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

Each base station also includes a mechanism to process the refinement signal received from a subscriber station. The processing determines refinement signal from the subscriber station and the value of any difference in timing between the system timing signal and the refinement signal. The function is to calculate an offset value by processing the refinement signal.

The corresponding structure is RPU 14 and equivalents thereof.

The recited function of this "means-plus-process" element is processing the received refinement signal from the subscriber station and determining any offset between that refinement signal and the system timing signal from the master clock.

The disclosed structure is an RPU, CCU and associated control software which is configured to compare the base station system timing signal with the subscriber station refinement signal to determine a fractional offset value (Δt) therebetween until either (a) successive Δt 's are less than a threshold value, or (b) an elapsed refinement period expires. The associated software is further configured so that there is no further transmission or processing of the refinement signal for the duration of the call once voice communication is enabled.

The special master recommends that the Court conclude as follows:

The claimed function of the "means" is "processing the refinement signal received from a subscriber station in relation to the system timing signal" to determine a particular value, namely "the value of any offset between the timing of the system timing signal and the timing of the refinement signal." The "corresponding structure" disclosed for performing that function is RPU 14, CCU 23, and associated software described as performing that function.

Under the terms of § 112(6), the claim should therefore be construed to cover that corresponding structure and equivalents thereof.

means for communicating the determined offset value to the subscriber station; and

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

The base station also includes a mechanism to send the value of any difference in timing to the subscriber station.

The function is to transmit the offset value to the subscriber station.

The corresponding structure is modem 106 and equivalents thereof.

The recited function of this "means-plus-function" element is communicating the determined offset value from the base station to the subscriber station.

The disclosed structure is a CCU, modem and associated software which is configured to transmit the determined offset value to the subscriber station only prior to commencement of voice operation.

The special master recommends that the Court conclude as follows:

The claimed function is of the "means" is "communicating the determined offset value to the subscriber station." The "corresponding structure" disclosed for performing that function is modem 106, CCU 23, and associated software described as performing that function.

Under the terms of § 112(6), the claim should therefore be construed to cover that corresponding structure and equivalents thereof.

wherein the subscriber station further includes

means coupled to the internal timing generator for processing the offset value communicated from the base station to adjust the subscriber station timing signal to reduce said offset.

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

The subscriber station also includes a mechanism coupled to the internal timing generator that processes the value received from the base station.

The mechanism adjusts the subscriber station timing signal to reduce any difference in timing.

The function is processing the offset value received from the base station and adjusting the subscriber station timing signal to reduce the offset.

The corresponding structure is BBP 112 and equivalents thereof.

The recited function for this "means-plus-function" element is processing the received offset values and adjusting the subscriber station timing signal to reduce the offset between the base station timing signal and the subscriber station refinement signal.

The disclosed structure is a baseband processor coupled to the internal timing generator of the subscriber station along with an associated software routine. The associated software routine is

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

configured to periodically average received fractional offset values (Δt) to determine the mean offset value (mean Δt) and to adjust the timing of the subscriber station internal timing generator by mean Δt after the occurrence of either (a) a predetermined number (P) of received verified Δt -s are within a predetermined tolerance of the mean Δt , or (b) a predetermined number (Q) of negative determinations that received verified Δt -s are not within a predetermined tolerance of the mean Δt .

The special master recommends that the Court conclude as follows:

The claimed function of the "means" is "for processing the offset value communicated from the base station to adjust the subscriber station timing signal to reduce said offset." That means is "coupled to the internal timing generator." The "corresponding structure" disclosed for performing that function is baseband processor 112 coupled to internal timing generator 113, and associated software described as performing that function.

Under the terms of § 112(6), the claim should therefore be construed to cover that corresponding structure and equivalents thereof.

IX.
U.S. Patent No. 4,785,450 (the '450 Patent)

InterDigital assets only claim 1 of the '450 patent, which provides, with paragraphs added for ease of reference, and the disputed terms shown in bold:

1. In a communication system provided with a base station that is in communication with a central office and subscriber stations that are connected to said base station by RF channels,
said base station having
multiple sequentially repetitive time slots and a plurality of frequency channels,
said time slots and frequency channels being selectively assignable to said subscriber stations by movement of said subscriber stations to selected va

cant time slots or frequency channels in accordance with a predetermined assignment schedule,

said system including assignment means for selectively assigning time slots and frequency channels to any of the subscriber stations in response to either the coming on line of an additional subscriber or to a deterioration in transmission between the base station and a subscriber station in communication therewith.

A. "subscriber stations" and "predetermined assignment schedule"

With respect to the "subscriber stations" and "predetermined assignment schedule" terms, the parties' respective positions are:

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction

The time slots and frequency channels can be assigned to a subscriber station by moving an assigned subscriber to a vacant time slot or frequency channel in accordance with a predetermined assignment schedule, which is a set of rules.

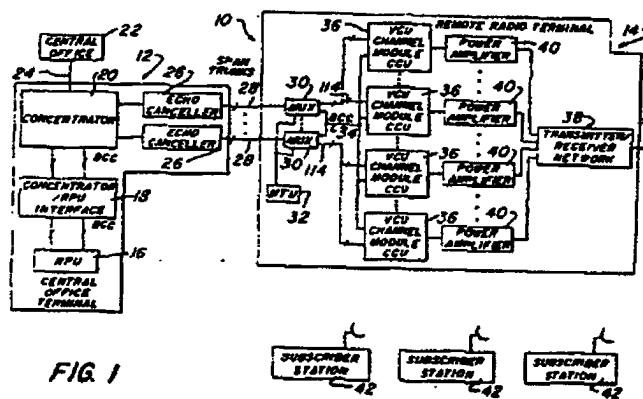
The frequency channels and time slots within the frequency channels are assignable by movement of a connected subscriber station from its present timeslot to a selected vacant timeslot in the same or another frequency channel in accordance with a predetermined assignment schedule. Movement of a connected subscriber station from its present timeslot to a selected vacant timeslot in the same or another frequency channel is done in accordance with an allocation schedule defining rules for movement of subscriber stations based on the type of subscriber station being moved.

Ericsson argues that the "reference to said 'subscriber stations' is to those subscriber stations already connected to the base station and in communication therewith," and that the "term 'predetermined assignment schedule' means a schedule that moves connected subscriber stations based on their type." Ericsson's Post-Hearing Brief at 42. InterDigital, on the other hand, argues that in "the context of the '450 application and the file history, there is no basis for limiting the phrase 'assignment schedule' to any particular rule or rules. * * * Furthermore, there is no basis for limiting rules of movement [i.e., the "predetermined assignment schedule"] to the type of subscriber station being moved." InterDigital's Pre-Hearing Reply Brief at 29.

1. Brief Description

The “type of subscriber station being moved” requires a brief explanation. In general, the ‘450 patent is directed toward a wireless digital telephone system and particularly one in which “a plurality of subscriber stations” are connected to a base station “by RF channels in a manner to permit simultaneous communications with the subscriber stations over a given channel having multiple sequentially repetitive time slots, with particular time slots being assigned to particular subscriber stations.” (Col. 1, lines 6-14) InterDigital refers to that as “frequency agility,” InterDigital’s Pre-Hearing Brief at 21, and explains that “[i]f transmission quality deteriorates or if additional subscribers come into an FD/TDMA system, a subscriber station may have to be reassigned from a first to a second channel frequency, time slot, or both (i.e., handoff).” *Id.*

Fig. 1 is said to illustrate a "block diagram of a base station utilized in the present invention, the connected subscriber stations being generally indicated" (Col. 2, lines 34-36):



Many of the labeled components are now familiar and need no further explanation to understand the issues raised by the parties. The '450 patent also discloses, however, several different "types" of subscriber units, i.e., the "types" that InterDigital was referring to:

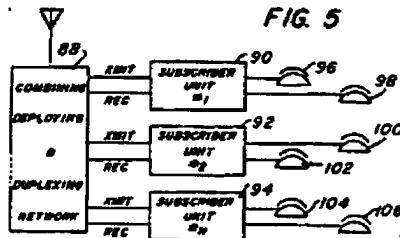
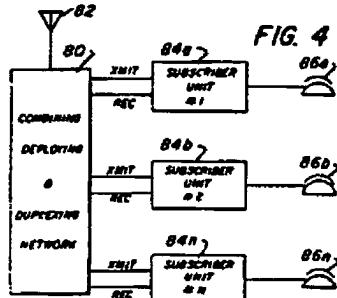
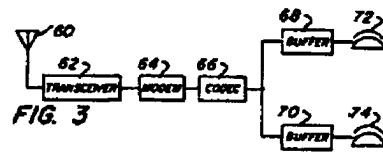
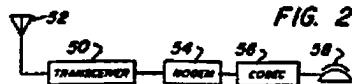


Fig. 2 illustrates a single subscriber unit, Fig. 3 illustrates a dual subscriber unit, Fig. 4 illustrates a multiple single-subscriber unit, and Fig. 5 illustrates a multiple dual-subscriber unit.

2. Discussion

When InterDigital argues that "there is no basis for limiting rules of movement to the type of subscriber station being moved," though, InterDigital is relying on a portion of the specification that says "[t]he present invention is utilizable in a system such as disclosed in * * * [the '863 patent]." ('450 patent, Col. 1, lines 47-50) InterDigital argues that the '863 patent discloses subscriber units, but does not disclose the different "types" illustrated above and in the '450 parent. Therefore, InterDigital reasons, the "rules of movement," i.e., the "predetermined assignment schedule," cannot be based on subscriber unit "type."

Ericsson responds that there is but one example given in the specification on this issue, and that example describes a predetermined assignment schedule that moves subscriber stations based on their respective types. Ericsson is correct. The specification discloses that:

During operation, it frequently occurs that all four slots of a particular frequency are occupied by various subscribers. Assume, for example, that there is

one dual subscriber unit while the others are single subscriber units. In the case of the dual subscriber unit it is necessary * * *.

* * * * *

The analogous situation exists with multiple single unit subscribers, such as in FIG. 4. * * *

Where the system is that of FIG. 5, where there are multiple dual subscriber units, the first subscribers of each pair of dual subscribers must be in the same slot but on different frequencies while the second of each pair must be in adjacent slots on the same frequencies as their respective first subscribers.

(Col. 4, line 27-Col. 5, line 31) Additionally, Ericsson relies on the prosecution history. In an Office Action dated April 18, 1988, the PTO rejected all 10 claims that were originally presented in the application as filed. The rejection was under § 103, and the examiner wrote that those 10 claims were unpatentable over U.S. Patent No. 4,215,244 to Gutleber. In an amendment filed May 31, 1988, InterDigital cancelled claims 1-3, and amended claim 4 to add the term now in dispute.⁴⁰ Specifically, InterDigital amended claim 4 to specify that the time slots and frequency channels were selectively assignable "by movement of said subscriber stations to selected vacant time slots or frequency channels in accordance with a predetermined assignment schedule." Amendment at 3. In response, the application was allowed. Application claim 4 became patent claim 1. In the remarks accompanying that amendment, however, InterDigital explains that the "RPU includes a memory which utilizes a fixed matrix containing a predetermined pattern of frequencies and time slots whereby subscriber calls are moved to appropriate vacant time slots in accordance with an allocation schedule." Amendment at 5. InterDigital said nothing about subscriber "type." Nor is there anything else in the amendment indicating that "predetermined assignment schedule" means a schedule based on subscriber "type."

Although the example given in the specification describes assignments that take into account subscriber "type," that alone is not sufficient to limit "predetermined assignment schedule" in the claims to what is specifically described in that one example. Indeed, even though "predetermined assignment schedule" may not be a term of art, as Ericsson argues, nevertheless, there is hardly anything ambiguous about the term. As InterDigital correctly points out, in the context of the specification, a predetermined assignment schedule is simply a set of rules.

⁴⁰ InterDigital also added a new claim, claim 11, that is not germane to the present issue.

As for Ericsson's additional argument that "predetermined assignment schedule" cannot be non-arbitrary, the prosecution history simply does not provide Ericsson any support. In the amendment discussed above, InterDigital distinguished the Gutleber reference, *inter alia*, saying that the "Gutleber system is adapted to be used only for interfering signals from adjacent or moving signals. There is no base station * * * and there is no means to move a subscriber from one time slot to another." Amendment at 4. InterDigital said that in its system used the RPU, memory and fixed matrix, as set out above. *Id* at 5. Whether the "rules" were arbitrary or not was never raised.

Ericsson also urges that the reference to "said subscriber stations" refers to the earlier reference in the claim where it says that "subscriber stations that are connected to said base station by RF channels." Ericsson is correct that "said subscriber stations" finds antecedent basis in the earlier reference to "subscriber stations." The claim also says that those stations are "connected" to the base station by RF channels. There is nothing unclear or ambiguous about that. Ericsson wants to add that the subscriber stations are connected to the base "and in communication therewith." The claim does not say that, and Ericsson has provided no sufficient reason to add that qualification.⁴¹

B. "assignment means"

1. The Dispute

As noted above, claim 1 of the '450 patent calls for:

said system including assignment means for selectively assigning time slots and frequency channels to any of the subscriber stations in response to either the coming on line of an additional subscriber or to a deterioration in transmission between the base station and a subscriber station in communication therewith.

The parties and the special master agree that is cast in means-plus-function format and should be governed by § 112(6).

The parties say that there is no dispute that there are two functions associated with the "assignment means" and that those two functions are stated using the disjunctive "or." Specifically, the claim says that the "assignment means" performs the function of "selectively assigning time slots

⁴¹ Ericsson's comments, Ericsson's Comments at 6-8, have been considered, but are rejected. It is clear from the language of the claim that "In communication with" does not modify both "central office" and "subscriber stations." As InterDigital notes, that result does not depend on a "missing comma" as Ericsson argues. InterDigital's Response at 3, n. 2. Neither the specification nor the prosecution history compel a different conclusion.

and frequency channels to any of the subscriber stations in response to either (1) the coming on line of an additional subscriber" or (2) "to a deterioration in transmission between the base station and a subscriber station in communication therewith." The dispute, the parties say, is whether the "means" must perform *both* of those "functions," or just one or the other.

2. The Parties' Proposed Constructions

The parties' respective proposed constructions are:

InterDigital's Proposed Claim Construction

The communication system also includes a processing unit that assigns time slots and frequency channels to any of the subscriber stations. The assignment is made in response to either:

An additional subscriber station coming on line; or

A deterioration or worsening in the transmission between a subscriber station and the base station.

The recited function is the assignment of time slots and frequency channels in response to either an additional subscriber station coming on line or a deterioration in the transmission between a subscriber station and the base station.

The corresponding structure is RPU 18 and equivalents thereof.

Ericsson's Proposed Claim Construction

The recited function of this means-plus-function element is (1) selectively assigning a vacant time slot in a frequency channel for use by an already connected subscriber station in response to a previously unconnected subscriber call coming on line and (2) selectively assigning a vacant time slot in a frequency channel for use by an already connected subscriber station in response to the already connected subscriber station experiencing a deterioration in transmission between the base station and the already connected subscriber station.

The assignment means has to be capable of performing both of (1) and (2).

The disclosed structure, which must be capable of performing both of the recited functions, is an RPU including a memory which utilizes a fixed matrix containing a predetermined pattern of frequencies and time slots whereby subscriber calls are moved to appropriate vacant time slots in accordance with an allocation schedule based on whether the type of subscriber is a single subscriber, a dual subscriber, a multiple-single subscriber or a multiple-dual subscriber.

As a matter of law, the "equivalents thereof" are limited to alternative structure that will function at a base station and subscriber station to respond to both (a) an unconnected subscriber call coming on line and (b) an already connected subscriber station experiencing a deterioration in transmission between the base station and the connected subscriber station by moving subscriber stations in accordance with a predeter-

InterDigital's Proposed Claim Construction Ericsson's Proposed Claim Construction
mined allocation schedule.

3. Discussion

This is one of those "disputes" that should not be a "dispute" at all. Despite the parties' professed "dispute" over the word "or," both parties agree that the "corresponding structure" is RPU 18. Although InterDigital does not include the associated software in its proposed construction reproduced above, in its pre-hearing brief, InterDigital explains that "[t]he '450 parent discloses a radio processing unit, RPU 18, that controls the assignment of frequency channels and slots. * * * The RPU is a processor with associated memory programmed to perform the recited function." InterDigital's Pre-Hearing Brief at 23. In actuality, of course, the software that forms part of the "corresponding structure" is the software actually disclosed for performing that function, as discussed repeatedly above.

In any event, § 112(6) says that when a claim is cast in means-plus-function form, then the statute requires that "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." Once it is determined that the RPU and associated software is the "corresponding structure," then the claim (or rather this element) must be construed to cover that "corresponding structure." Further, Ericsson says that the RPU "reassigns frequency/slots in response to both alternative conditions." Ericsson's Post-Hearing Brief at 43. That merely confirms that the RPU and associated software make up the "corresponding structure" regardless of whether the two conditions are construed conjunctively or disjunctively. It simply does not matter.

Even so, it may, perhaps, be appropriate to comment briefly. Certainly the claim uses the term "or." No one disputes that. Further, no one can dispute that "or" states an alternative condition. Be that as it may, the parties are incorrect in construing this claim as stating two functions whether in the alternative or not. The claim actually recites a single function that has two conditions. Specifically, the claim says that the "assignment means" performs the function of "selectively assigning time slots and frequency channels to any of the subscriber stations." That single function has two conditions, namely "in response to either" (1) "the coming on line of an additional sub-

scriber" or (2) "to a deterioration in transmission between the base station and a subscriber station in communication therewith." In short, the "assignment means" must be capable of performing the function of "selectively assigning time slots and frequency channels to any of the subscriber stations" if *either* of the two stated conditions should occur. If the "means" must be capable of performing the function should either condition occur, *perforce* the "corresponding structure" must be capable of performing the function should either condition occur.

C. Recommendation

The special master recommends that the Court conclude:

- "said subscriber stations" finds antecedent basis in "subscriber stations that are connected to said base station by RF channels," but does not require the additional limitation "and in communication therewith."
- "predetermined assignment schedule" does not require a schedule based on subscriber station "type."
- "assignment means" has a single function, *i.e.*, "selectively assigning time slots and frequency channels to any of the subscriber stations," which in turn has two conditions, namely "in response to either" (1) "the coming on line of an additional subscriber" or (2) "to a deterioration in transmission between the base station and a subscriber station in communication therewith," and the corresponding structure described in the specification for performing that function in the event of either of those two conditions is the RPU together with the software for performing that function.

X.
Final Report and Recommendation

This is the special master's final report and recommendation under the Court's Order of August 18, 1999. The parties are reminded that any objections or further action regarding this report and recommendation are due in accordance with the Federal Rules of Civil Procedure and applicable orders of the Court.

SIGNED at San Antonio, Texas on September 8, 2000.



Gale R. Peterson
Special Master

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing SPECIAL MASTER'S FINAL REPORT AND RECOMMENDATION ON CLAIM CONSTRUCTION, has been forwarded on September 8, 2000 by United States mail to:

Clerk
United States District Court for the Northern
District of Texas
Earle Cabell Federal Bldg.
1100 Commerce Street
Dallas, Texas 75242

The Honorable Barefoot Sanders
Senior Judge
United States District Court
Earle Cabell Federal Bldg.
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